

# **R&D Plan – This Year**

**Refine Extrusion Module Conceptual Design**

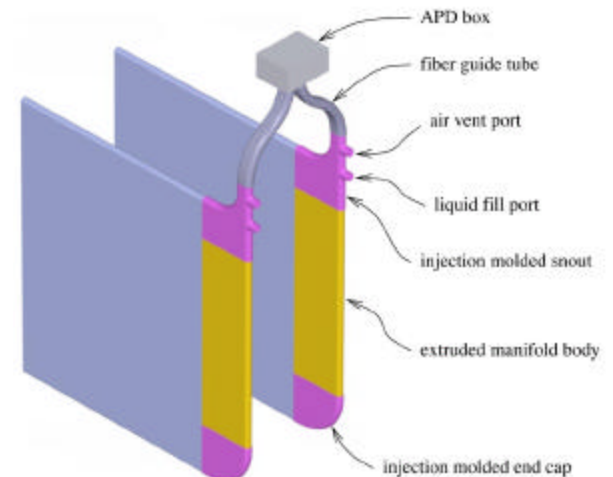
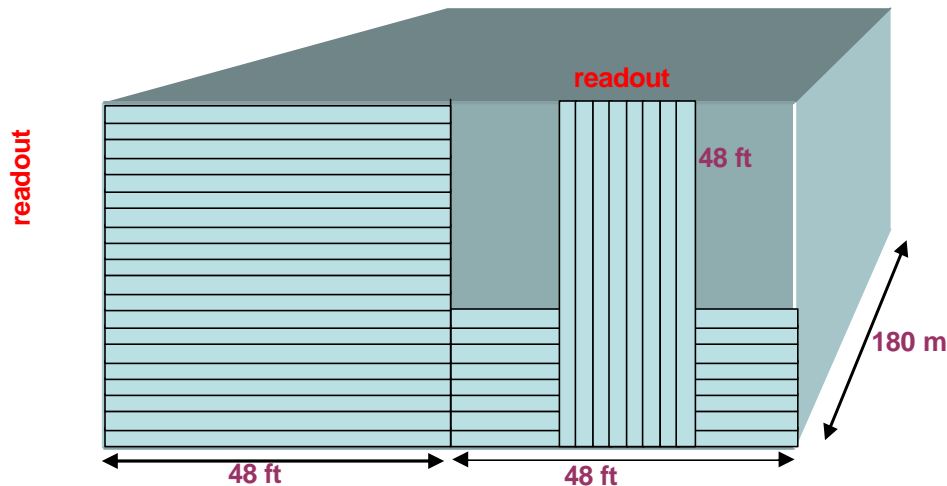
**Refine Electronics Conceptual Design**

- **Extrusion Mechanical Tests**
- **Extrusion Light Yield Tests**
- **Scintillator Mixing**
- **APD Electronics Testing & Design**

**Pre- prototypes**

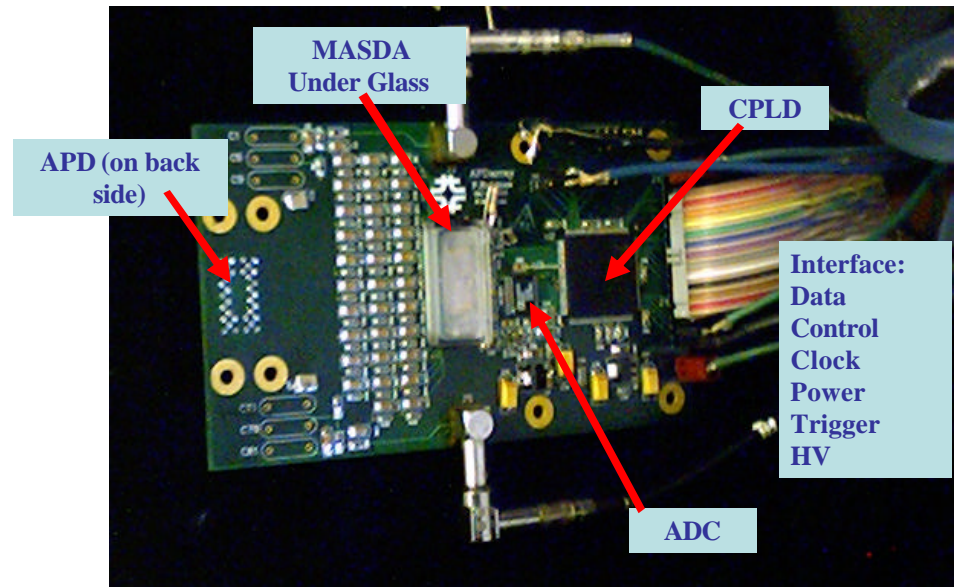
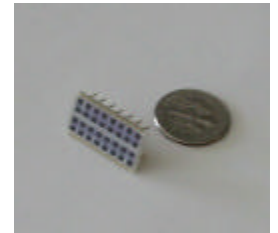
# Pre-Prototypes - Extrusions

- 3 cell profiles (4 cm x 2.5 cm per cell), 12%  $\text{TiO}_2$ 
  - 4 ft long for most tests
  - 48 ft long for “vertical slice”
  - 10 ft long for cosmic ray test?
- Hand crafted end seals and manifolds
- Looped fiber



# Pre-Prototypes – APD Electronics

- “Off-the-shelf” Hamamatsu APDs (32 pixels)
- “Off-the-shelf” MASDA chip
- Hand crafted circuit board
- Hand crafted Peltier cooling



# Current Scintillator R&D

## Hardware

- Argonne - stack assembly, beam trigger, cosmic ray tests
- Caltech – accelerated lifetime, light yields
- Fermilab – front end electronics, cosmic ray tests, detector structure
- Harvard - front end electronics
- Indiana – light yields, module assembly, scintillator handling
- Minnesota – apds, front end electronics, module assembly, full length test
- Rutherford/Oxford – daq interface to fee
- Texas A&M – module assembly
- Texas – full length test
- William & Mary – stack assembly, cosmic ray tests

## Simulations & Cost

- Fermilab
  - Minnesota
  - Stanford
- Optimize cell size, absorber thickness

# **R&D Plan – Next Step (2 year plan)**

## **Conceptual Engineering for Refined Design & Costing**

- **Bare APDs (Hamamatsu)**
- **Matched Electronics (ASIC)**
- **Integrated Electronics Design**
- **Integrated Scintillator Module Design**
- **Factory Machine Design**
- **Scintillator Handling System**

## **Prototypes**

- **Bare APDs and Front End Electronics in Box (\$400K)**
- **Injection Molded Manifolds, Seals, Connectors (\$100K)**
- **30 cell PVC extrusion (\$250K)**
- **Factory Machines (\$200K ??)**
- **Scintillator Mixing System (\$100K)**

## **Construct 1 Plane Prototype at Fermilab**

## **Construct Surface Detector at Soudan?**